POWDER RIVER

TRACT PROFILE
SOUTHWEST OTTER CREEK TRACT, MONTANA

(Estimated circa. 1981)

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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SITE SPECIFIC ANALYSIS
2. SOUTHWEST OTTER CREEK

INTRODUCTION

A. PURPOSE AND NEED

The purpose of this analysis is to comply with the Secretary of Interior's decision that a sufficient number of tracts be delineated and selected for sale from the areas designated in land use plans as acceptable for further consideration for leasing to meet the regional leasing target. As a result of the 1979 Powder River Management Framework Plan (MFP) Update, federal coal in this tract was identified for further consideration for development through competitive leasing.

It should be noted that the acreage and legal description of federal coal discussed in this Site Specific Analysis is limited to those areas that have been included in the comprehensive land-use plan, in accordance with Section 3(A)(i) of the Federal Coal Leasing Amendments Act of 1976, and the decision of the U.S. Secretary of Interior June 2, 1979, that the coal to be selected for sale come "from the areas designated in land-use plans as acceptable for further consideration," (page 60 of Volume I of the Secretarial Issue Document). The coal deposit tonnage listed from the Engineering Report of the U.S. Geological Survey includes areas outside of the BLM planning area.

I. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A. NO ACTION ALTERNATIVE

Under the no action alternative, federal coal would not be leased. Because of the "checkerboard" ownership patterns, development would not occur on this tract. Approxiamtely 403.8 million tons of coal, recoverable by existing methods, would not be mined. It should be noted that mining of fee coal will take place in the nearby area with attendant growth and development to occur.

B. PROPOSED ACTION

The proposed action is to offer for competitive leasing a 7,443-acre tract of land in western Powder River County and eastern Rosebud County, containing 403.8 million recoverable coal. The tract comprises an area identified by the U.S. Geological Survey as an economical mining unit for development of a 40-year strip mining operation. The tract is located approximately seven miles southeast of Ashland and five miles south of U.S. Highway 212. See Map 1 for location and legal description.

The mining operation would have an annual production of 10.1 million tons and would employ 401 persons during construction and 364 persons during production. The tract is composed of 135.4 million tons of federal coal, 49.5 million tons of state coal, 218.9 million tons of fee (private) coal and surface disturbance would be approximately 186 acres a year. Total disturbed area would be 7,443 acres from mining and 287 acres from facilities and haul roads.

For more specific information on the proposed mining operation, refer to the Engineering Report prepared by the U.S. Geological Survey.

The proposed action assumes that proper mining and reclamation will be carried out according to existing state and federal regulations. These include: Office of Surface Mining Reclamation and Enforcement (OSM) regulations (30 CFR 700-899), Environmental Protection Agency (EPA) regulations (40 CFR 0-1399), Department of the Interior's coal management program regualtions (43 CFR 23 and 3400 and 30 CFR 211), and regulations of the Montana Department of State Lands.

Tract Delineation Report Summary

Tract Name: Southwest Otter Creek State: Montana

The Southwest Otter Creek tract is located in the center of the northern Powder River Basin, Powder River County(ies), Montana. The tract contains three recoverable coal beds, the Knobloch, the Sawyer and Nance, which are present in multiple seam.

The coal deposit occurs in the top part of the Fort Union Formation (Paleocene), which comprises approximately 3,000 feet of sandstones, shales, siltstones, and coal seams. The formation occurs in nearly flat-lying beds. The coal is subbituminous in rank and weighs 1,770 tons per acre-foot. There are no known geologic hazards to surface mining in the SW Otter Creek tract. See the tract profile summary for the salient geologic data for the tract.

The generic mining plan calls for a surface mine using draglines, electric shovels, dump trucks, loaders, scrapers, and other support equipment. The coal would thus be mined to a depth of 200 feet or until the limiting stripping ratio (6:1) has been reached. The plan indicates that the coal would be shipped by railroad to an electrical utility out of the Powder River Region.

Tract Profile Summary

Southwest Otter Creek

Coal Data	Proposed Action
Total Reserves (Million Tons Strippable)	150
Recoverable Reserves (Million Tons)	federal 35 (total 403.8)
Average Coal Thickness (Ft.)	40
Average Overburden (Ft.)	150
Coal Rank	subbituminous
Percent Recovery	90
Proximate Coal Analysis	
Percent Moisture	30.3
Percent Ash	3.9
Percent Sulfur	0.3
BTUs Per Pound	8,194
Mine Life (Years)	40
Annual Production Rate (Million Tons)	10.1
Tract Area (Acres)	7,443
Surface Mine/Truck Shovel Operation	
Employment	
Construction	456
Mine Operation	364
Environmental Data	
Water Requirements	127 acre-feet/year.
Transportation, Land Use, VRM, Vegetation	Moderate during mining; low after mining.
Soils	High to moderate.
Reclamation	Low, if successful.
Wildlife	Moderate loss of habitat.
Noise, Air Quality	High during mining, low after successful reclamation.
Agriculture	Moderate during mining; low after successful reclamation.

TRACT PROFILE INTRODUCTION

Background

In July 1979, the BLM, Miles City District Office completed the Powder River Resource Area update for portions of Powder River, Custer, Big Horn, Treasure and Rosebud counties. The land use planning process included applying unsuitability criteria, multiple-use conflict evaluation, and surface owner consultations. As a result of that work, areas were identified that could be further considered for coal development. The areas are available for consideration for new competitive leasing, leasing by exchanging and modifying existing leases.

Following land-use planning the BLM requested expression of interest which, along with other information, guided the GS in delineating this tract. Results of that work are summarized in this profile.

Personnel from BLM, Miles City District inventoried the tract to determine the site specific resource values and then analyzed potential environmental effects of coal development on this individual tract. Among other items, the unsuitability criteria (43 CFR 3461) were reconsidered on this site-specific basis. Any new findings of unsuitability are reflected in the delineation and development proposal of the tract described in this profile.

To be further considered for new competitive leasing, the tract will be presented to the Regional Coal Team who guides and reviews tract ranking and selection and sale scheduling procedures that develop alternatives which would be analyzed in a regional environmental impact statement (EIS). The EIS would analyze the site-specific and regional cumulative effects of coal leasing and development. Alternatives addressed in the EIS would include different combinations of tracts that meet a regional coal leasing target. The analysis of those groups of tracts would result in different impacts than the assessment made in this document for this specific tract. During the process this preliminary tract could be modified. Ultimately, the Secretary will select specific tracts for lease sale. If the tract is leased, the lessee would be required to submit a plan for mining and reclamation (M&R) to the Secretary of Interior, Office of Surface Mining (OSM) for review and approval within 3 years after leasing. Once a mining plan has been submitted, OSM would review the proposed developments of the mining plan. OSM would prepare a site-specific environmental assessment or EIS prior to approval of the mine plan.

Development of the tract is in accordance with the federal coal management program adopted by the Secretary, Department of the Interior, in June 1979. Basis of the program was, in part, the Final Environmental Statement for the Federal Coal Management Program. Implementation procedures are contained in Title 43 - Code of Federal Regulations - Part 3400 (43 CFR 3400). Authorizing actions are The Mineral Leasing Act of 1920, as amended; The Mineral Leasing Act for Acquired Lands of 1947, as amended; the Federal Land Policy and Management Act of 1976; the Surface Mining Control and Reclamation Act of 1977; the Multiple Mineral Development Act of 1954; the Department of Energy Organization Act of 1977; the National Environmental Policy Act of 1969; the Federal Coal Leasing Amendments Act of 1976, as amended; the Act of October 30, 1978, and Federal Regulations concerning federal coal leasing and development including 43 CFR 3400; 30 CFR 211; and 30 CFR 700-899.

In adopting the coal program, the Secretary established a tentative competitive coal leasing target of 776 million tons for 1982 in the Powder River Region of Wyoming and Montana. Subsequent sales would then follow on a 2 to 4 year cycle.

Purpose and Need for Action

Purpose of the action is to offer strippable federal coal reserves that can be further considered for coal leasing and development to help meet the energy needs of the nation.

This tract profile contains a summary of the tract delineation report and a site-specific analysis (SSA). The United States Department of the Interior, Geological Survey (GS) delineated the tract while the Bureau of Land Management (BLM) completed the site-specific environmental inventory and preliminary analysis.

Figure 1.2-1

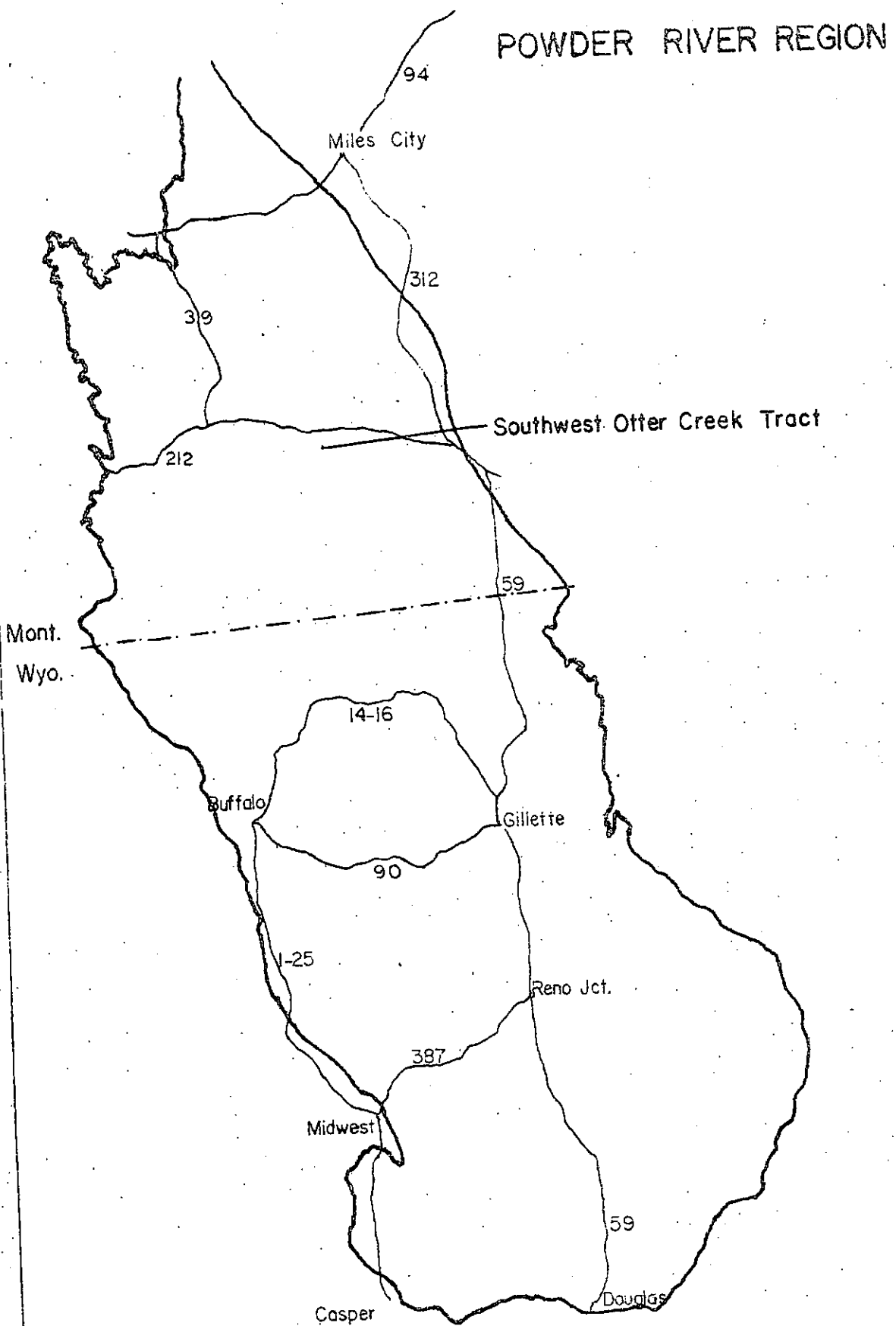
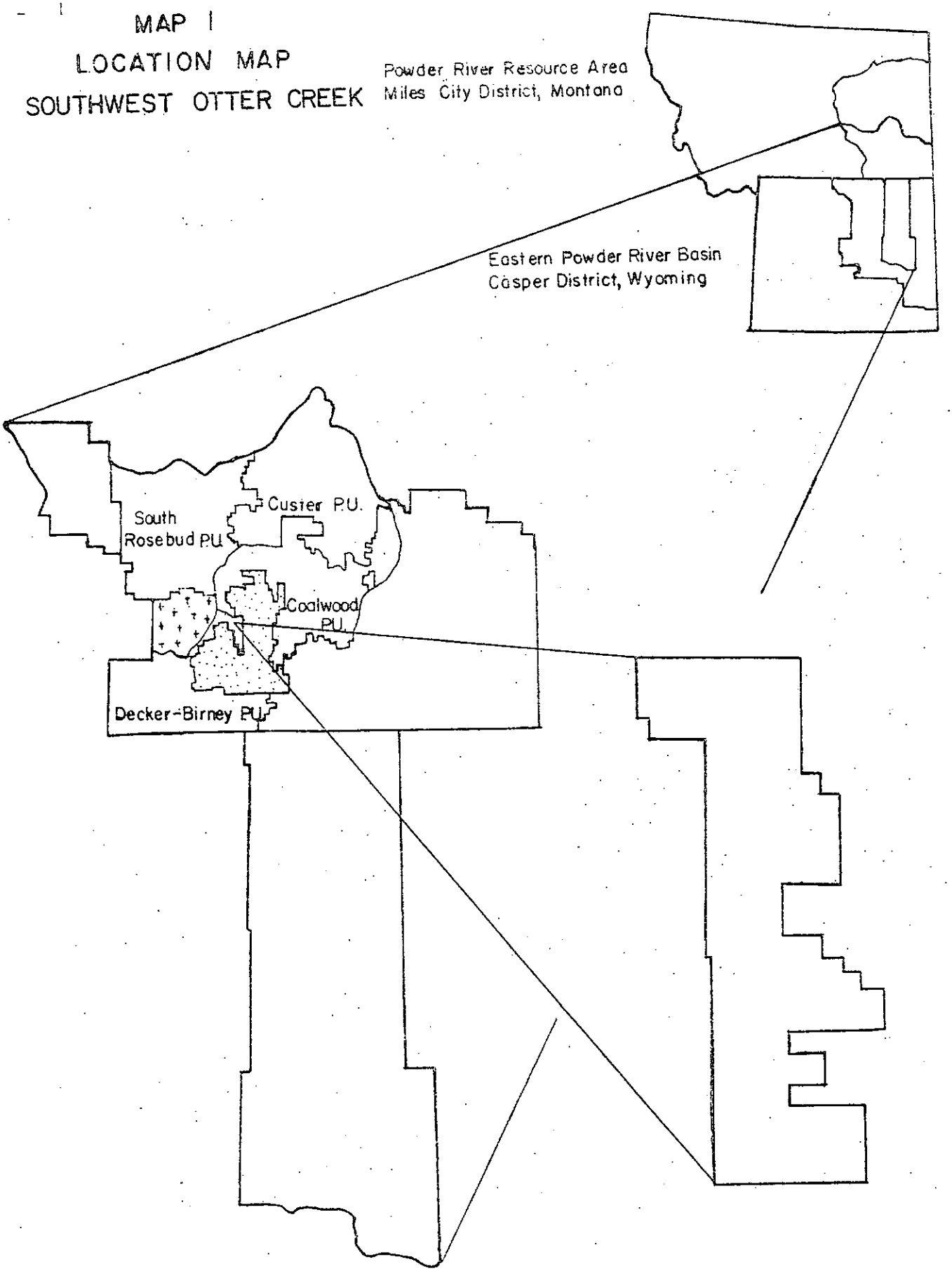
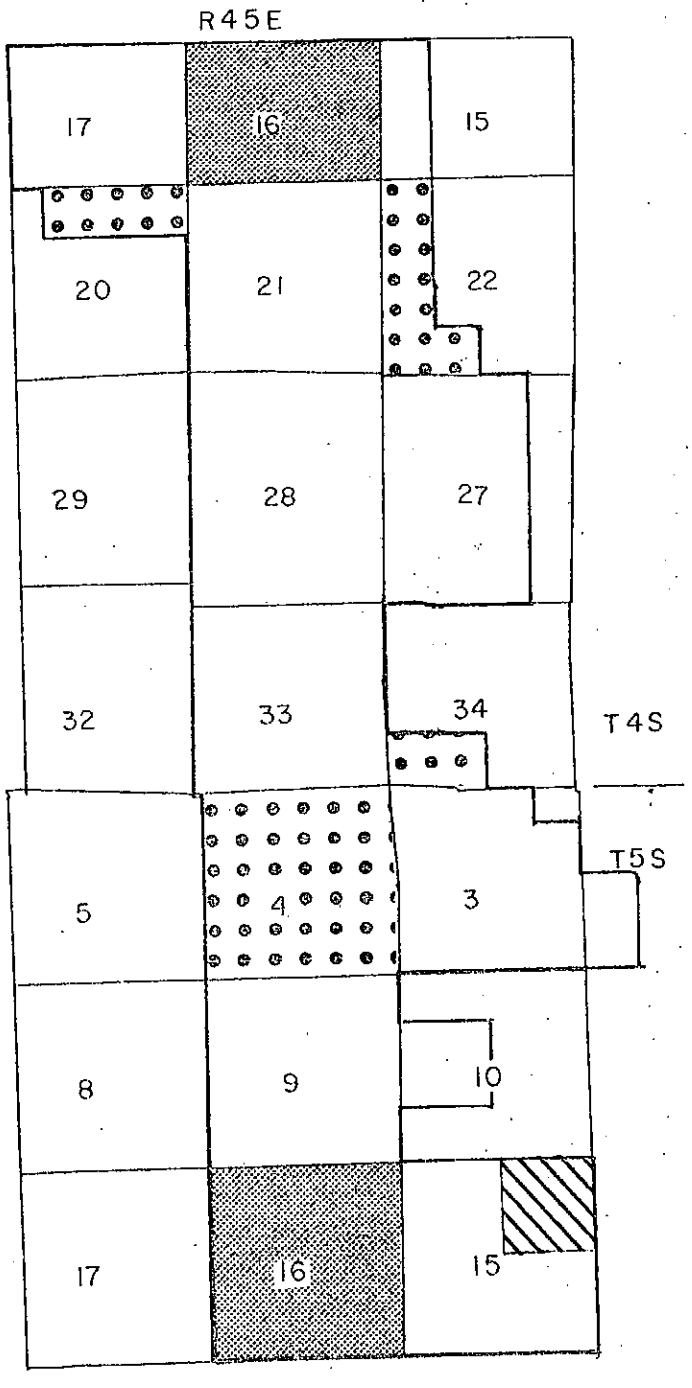


FIGURE 1.2-1

MAP I
LOCATION MAP
SOUTHWEST OTTER CREEK





TRACT Southwest Otter Creek Proposed action

Federal Coal

State Coal

Mine Facilities

II. AFFECTED ENVIRONMENT

The environment that currently exists and changes anticipated from ongoing trends are included in this section. Information is presented within the time frame of the proposed action including the alternatives, and is restricted to that information required to assess significant impacts.

A. TOPOGRAPHY

The tract is situated adjacent to the northward flowing Otter Creek. The surface varies from flat to gentle slopes along Otter Creek to steep semi-badland type topography at higher elevation. Drainages have developed a dendritic pattern with the main branches flowing eastward into Otter Creek.

Elevations range from 3,040 to 3,580.

B. GEOLOGY

The area is underlain by sandstone, shale and coal belonging to the Tongue River Member of the Fort Union Formation (Paleocene). The coal seams of economic interest within the tract consist of splits off the Knobloch bed. The splits in the northern half of the tract are confined to two benches--the Knobloch and the Nance beds.

The southern half of the area has up to six beds that may have economic significance.

Estimated recoverable reserves have been placed at 403.8 million tons distributed among the following ownership: Federal-135.4 million tons, State-49.5 million tons, and Fee (Private)-218.9 million tons. BTU values of the different beds range from 8,194 to 8,800 on an as received basis.

C. PALEONTOLOGY

Known paleontological resources in the area consist of poorly silicified tree fragments and pieces of unidentified calcareous shells. Fossils possessing exceptional scientific value are not known to occur in the tract.

D. SOILS

Soils within the tract are formed in sandstone, shale and alluvial deposits. The soils occur along steep-sided ridges, divides, footslopes and terraces. The underlying bedrock characteristics are closely reflected in the soils since they are not well-developed and loamy textures predominate.

There are 45 soil series in the tract, surveyed by the Soil Conservation Service at level two. The soils discussed are listed in Table 2-1.

TABLE 2-1
SOUTHWEST OTTER SOIL EROSION

Soil Mapping Unit Name	Depth Shallow 0-20"	Depth Moderately Deep 20-36"	Depth Deep 36+" 1/	Percent Slope	Soil Erosion Potential Wind 1/	Soil Erosion Potential Water 1/	Surface Acres	Percent of Area	Soil Reconst. Potential 2/	Soil Hazard Conditions	3/ Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
Bew silty clay			X	0-2	Mod.	Low	92	1	Poor	Too Clayey	—	—	4160
Bew silty clay			X	2-8	Mod.	Mod.	288	4	Poor	Too Clayey	—	—	1440
Cushman-Elso silt loams	X (.30)	X (.70)		4-8	Low	Mod.	6	<1	Good	—	7	3	2
Elso silt loam; Cabba Soc.	X			8-50	Low	Mod.	1210	16	Poor	Excess lime, slope	—	1090	748
Elso silt loam	X			15-45	Low	High	435	6	Poor	Excess lime, slope	—	252	470
Elso-Ocean lake association	X			15-45	Low	Low	135	2	Poor	Excess lime, slope	22	136	135
Farland silt loam			X	2-4	Low	Low	49	1	Poor	Excess lime	21	82	143
Farland and Haverson soils; Haverson silt loam, silty clay loam; McRae silt loam			X	0-8	Low	Mod.	260	4	Fair	Excess Lime	3	1295	1
Fergus-Relan association			X	2-8	Low	Low	12	<1	Poor	Excess lime	7	26	27
Gilt Edge silt loam; Hopley and Relan loams; Hydro silty clay loam; Hydro-Arvada complex			X	2-8	Low	Mod.	88	1	Poor	Excess Lime	55	55	308
Glenberg fine sandy loam			X	0-2	Mod.	Low	2	<1	Fair	Excess lime, too sandy	—	10	—
Haverson silty clay			X	0-2	Mod.	Mod.	21	<1	Fair	Excess lime	—	105	—
Haverson soils, channeled			X	0-4	Low	Mod.	92	1	Fair	Excess lime	—	460	—
Heldt silty clay loam			X	4-8	Low	Low	8	<1	Fair	Excess lime, too clayey	—	40	—

1/ Soil Depth Classification and Soil Erosion Potential is derived from the Powder River County Soil Survey Report.

2/ Soil Reconstruction Potential is derived from the National Soil Handbook.

3/ Depth (in acre feet) of available soil calculated from acres x acre feet/acre = suitability of soil material for plant growth.

Soil Mapping Unit Name	Depth Shallow 0-20"	Depth Moderately Deep 20-36"	Depth Deep 36+"	Percent Slope	Soil Erosion Potential Wind	Soil Erosion Potential Water	Surface Acres	Percent of Area	Soil Reconst. Potential	Soil Hazard Conditions	Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
Heldt silty clay loam			X	0-2	Low	Low	52	1	Fair	Excess lime, too clayey	—	260	—
Hesper silty clay loam			X	0-2	Low	Low	14	<1	Poor	Too clayey	—	7	6.3
Hesper silty clay loam; Thurlow silty clay loam			X	2-15	Low	Mod.	694	9	Poor	Excess lime, too clayey	—	615	2705
Keiser silty clay loam			X	0-2	Low	Low	142	2	Fair	Excess lime	118	592	—
Keiser silty clay loam			X	2-8	Low	Mod.	78	1	Fair	Excess lime	65	325	—
McRae silt loam			X	2-4	Low	Mod.	188	3	Fair	Excess lime	79	860	—
Midway silty clay loam	X			2-8	Low	Mod.	48	1	Poor	Excess lime, too clayey	—	—	56
Midway and Elso rocky soils; Midway-Elso association	X			8-75	Mod.	High	1910	26	Poor	Excess lime	—	343	2186
Midway-Thurlow association	X (.55)		X (.45)	8-15	Mod.	Mod.	24	<1	Poor	Excess lime, too clayey	—	12	58
Nihill-Elso association; Ringling-Relan association	X (.40)		X (.60)	16-25	Low	Mod.	1037	14	Poor	Excess lime	54	698	2525
Rapelje silt loam			X	2-8	Low	Mod.	21	<1	Fair	Too clayey	10	95	—
Remmit fine sandy loam			X	2-4	Mod.	Low	12	<1	Fair	Excess lime, too sandy	12	32	16
Remmit-Clan Lake fine sandy loam			X	8-25	Mod.	Mod.	202	3	Fair	Excess lime, too sandy	131	398	216
Ringling-Cabba association	X			15-50	Low	Mod.	14	<1	Fair	Excess lime, slope	—	14	4
Terrace escarpments			X	—	Mod.*	High	187	3	Poor	Slope, erosion	—	118	507
Thurlow silty clay loam			X	8-15	Low	High	27	<1	Fair	Excess lime, too clayey	—	79	12
Vananda clay			X	2-4	Low	Mod.	95	1	Poor	Excess lime, too clayey	—	—	475
						Totals	7443	100		Totals	584	8002	12,557

* variable wind erosion potential

Soil Depth
Shallow - 57%
Deep - 43%

Soil Erosion Potential
Wind
Low - 63%
Moderate - 37%

Water
Low - 6%
Moderate - 59%
High - 35%

Soil Reconstruction
Fair - 16%
Poor - 84%

Suitability of Soil Material for Plant Growth
Good - 2%
Fair - 22%
Poor - 33%
Unsuitable - 43%

E. WATER RESOURCES

1. Ground Water

Ground water characteristics in the tract are typical for the Otter Creek coal area. Only ten stock wells are in use in the tract. The Knobloch coal seam is a main source of water. It is saturated in the Tract and is preliminarily estimated to flow at 37,000 cu ft/day (Cannon 1980). Total dissolved solids (TDS) concen- tration or salinity averages about 2,500 milligrams per liter (mg/L) for Knobloch coal water in the area. TDS for five wells in the tract averages 1,200 and ranges from 750 to 2,800 mg/L.

2. Surface Water

Otter Creek is the only major stream in the vicinity of the tract. Stream flow is measured at Ashland, about six miles south (downstream). Mean annual yield is 67.22 acre feet/year or 0.54 cu ft/sec (USGS 1979). Approximately 4,200 acres of the drainage is irrigated, mostly by waterspreading (Knapton and McKinley 1977). Subirrigation is relied upon to supply moisture during the summer. Water quality data is available above and below the site (See Regional paper, unpublished manuscript in Miles City District Office of BLM). Total dissolved solids concentration (TDS) on index to salinity, varies from 228 to 2,690 mg/L and is seldom measured below 2,000 mg/L. Lower concentrations occur during high flows from snowmelt and storms in the winter and early spring. Sediment yield varies from 0-0.2 ac ft/sq mi/yr for bottomlands to 0.8-1.2 for hillslopes (EMRIA 1975).

Alluvial Valley Floors and Floodplains

Part of the tract contains a flood plain and possible alluvial valley floor (AVF) over public minerals. There is much overlapping of the floodplain and AVF. The floodplain is unsuitable for mining and final AVF determination will be made by the Office of Surface Mining at mine plan stage.

F. VEGETATION

The Southwest Otter Creek Economical Mining unit (EMU) is made up of two major vegetative rangeland types (Payne 1973). These are the undifferentiated stream bottoms and ponderosa pine savannah (See Regional paper). The area included in the two vegetative types consists of: (a) grassland - 2352 acres, (b) sagebrush-grassland - 3973 acres, (c) ponderosa pine - 614 acres, (d) Other - 504 acres.

Within these vegetative types, there are varying range sites with varying production yields (pounds per acre) and condition classifications. There are approximately 1,393 AUMs being produced per year on the tract.

G. LAND RESOURCES

1. Agriculture

Agriculture operations in this area are mainly livestock, hay (alfalfa or grass-legume) and some small grains. The bottomlands are flood-irrigated during spring runoff, then sub-irrigated for the balance of the growing season. The water in Otter Creek is too high in salts and alkalinity for irrigation the rest of the growing season. Alfalfa, grass-legume hay or small grains (oats or barley) are crops raised to feed the livestock in the winter months. Approximately 6.8 percent of the tract, which is Class II, III, and IV land, is currently being used as cropland. In addition, there are approximately 1441 acres of Class II, III, and IV privately-owned land (19.4 percent of the tract) that are suitable for cropping, but not presently cropped.

Approximately 1428 acres could produce approximately 5145 tons of alfalfa and support 714 AUMs or produce 32,574 bushels of winter wheat per year and have 13 acres suitable for tame pasture, which could provide 5.3 AUMs.

The State of Montana owns about 75 acres of Class II, III, and IV land (1.0 percent of the tract) that is suitable for cropland, but is not being cropped. Approximately 64 acres could produce 208 tons of alfalfa and support 32 AUMs or produce 1,536 bushels of winter wheat and have 11 acres suitable for tame pasture, which could provide 4.5 AUMs. The balance of all surface is being utilized as rangeland (see Vegetation section).

2. Recreation

The tract is relatively isolated from recreational use or demand and there are no recreational developments in the area. Some very limited hunting use may occur but any other recreational activity is quite unlikely, especially being adjacent to Custer national Forest, where opportunities are better. Since no public access exists, use of the tract for recreation would require landowner permission. This restriction, along with remoteness from population centers, effectively prohibits recreational use. The area contains no wilderness potential.

3. Other Land Uses

The land within the tract is presently used solely for ranching with some farming of hay and wheat fields in the bottomlands of the creek. There are no industrial activities and the only other use of the tract is for a small portion occupied by the Otter Creek road. Existing roads are gravel and receive low use and maintenance. There is no rail service at present, however, the Tongue River Railroad Company proposes to construct a railroad to run from Birney, to Miles City, MT, where it would connect with Burlington Northern tracks. The new mine would also require a 3-mile spur to be built to the tract. The route is not final and several alternatives have been proposed. If approved, construction would begin in 1982 with completion scheduled in 1984.

H. WILDLIFE AND FISHERIES

The Southwest Otter Creek tract supports a wide variety of wildlife, with nearby Otter Creek supporting a limited sport fishery for game and non-game fishes. Shrub species important to wildlife such as skunkbrush (Rhus trilobata), currant (Ribes spp.), rose (Rosa spp.) and snowberry (Symphoricarpos spp.) are found scattered throughout the tract. Some concentrations of shrubs occur in the draws.

Four sharp-tailed grouse arenas occur over private minerals within the tract. Attendance at these arenas was 6, 25, 12, and 14 males respectively, while average male attendance at all arenas in a 92 square mile area was 17.8 birds. Relative density for the tract is 0.34 arenas/sq mi.

Mule deer use occurs in all of the tract with summer densities of approximately 2.9 deer per sq mi. Winter use of the EMU appears to be minimal, but the moderate to steep slope areas of the adjacent Custer National Forest have been identified as wintering areas.

In the lower Otter Creek drainage, the EMU supports concentrations of antelope. Up to 80 head of antelope were observed during the summer months for an average density of 6.8 antelope per square mile. Two areas of concentrated winter use were observed in the EMU with up to 80 animals present during the open winter of 1979-80. The Otter Creek drainage may be marginal winter range for antelope as herd numbers dropped from over 200 to 77 during January when the worst winter weather for 1979-1980 occurred.

The lower Otter Creek drainage has been identified as a spawning stream for several species of fish migrating out of the Tongue River. Of greatest concern are the smallmouth bass and northern pike. Although the EMU does not include the stream, it does have a contributing influence on water quality and quantity.

The bald eagle has been observed as a migrant in the area and the golden eagle is a breeding resident in the lowe Otter Creek drainage. Five nests have been identified two miles east of the EMU boundary. No other threatened or endangered species occur in the area.

State of Montana species of special interest or concern found in or near the EMU are the Swainson's hawk, prairie falcon, upland sandpiper, mountain bluebird, clay-colored sparrow, Brewer's sparrow and field sparrow. Three prairie falcon nests occur two miles east of the EMU. Snapping turtles are common in Otter Creek.

I. CULTURAL RESOURCES

Within the Southwest Otter Creek tract, 1,849.42 acres overlying federal coal have been intensively inventoried in two cultural resource surveys contracted by BLM (Davis 1976, Bryant, Rollefson and Gehr 1980) (See Map 2). The two surveys recorded 16 prehistoric sites including 10 lithic scatter sites, three stone circle sites, three stone cairn sites, one historic homestead, and 33 isolated artifacts. Nine sites have been recommended eligible for the National Register of historic places, after consultation with the Montana State Historic Preservation Officer. The eligibility of two sites is undetermined. BLM is seeking concurrence on the determinations of eligibility from the Keeper of the National Register.

Present impacts to cultural resources derive principally from rodent disturbance, grazing activity, frost heaving and erosion. Projected site density for the unsurveyed portions of the tract at 95 percent confidence is 4.88 $\pm$ 1.19 sites per squre mile. There is a 53 percent probability of locating additional sites eligible for inclusion in the National Register, based on present information.

J. VISUAL RESOURCE MANAGMENT

The tract is located in an area used exclusively for ranching and some farming. The only current intrusions are the county road and those activities associated with the ranching and farming operations. Because of the rural nature, scenic quality is fairly good with low mountains, forested hills and some breaks in the area. This area contains scenic quality categorized as predominantly class C because of its largely common physiographic and vegetative characteristics. These are some limited ares of uniqueness in land in land form, color and vegetation which are categorized as class B.

K. ECONOMICS

Present employment in the affected areas of Colstrip and Forsyth in Rosebud County and Broadus in Powder River County is approximately 1,883 energy workers. New workers, including both construction and operational employees at Western Energy Co., Peabody Coal and MONTCO mines, the increased railroad activity and Colstrip 3 and 4 power plants will increase 1983 energy-related employment by 2,152

CULTURAL SURVEY CONDUCTED ON TRACT

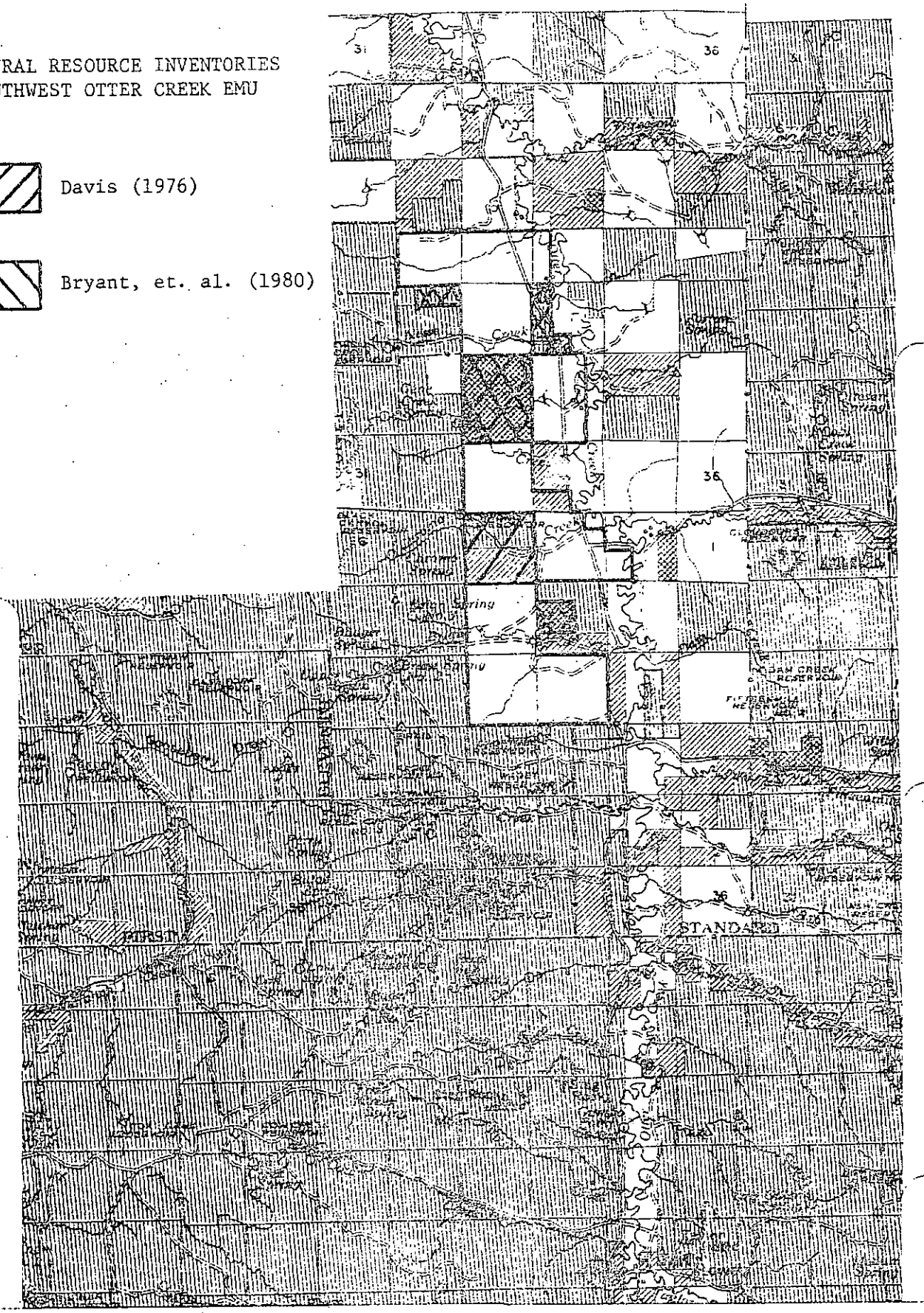
MAP 2

R. 45 E.

CULTURAL RESOURCE INVENTORIES
SOUTHWEST OTTER CREEK EMU

Davis (1976)

Bryant, et. al. (1980)



workers. About 679 jobs in secondary sectors in Rosebud County would form during the same time period largely as a respose to the new primary jobs.

By 1987 energy-related employment drops in Rosebud County by 2,027 workers, due to the withdrawal of construction work forces from Colstrip 3 and 4 and the MONTCO mine, partially offset by small gains in mining and power plant operating work forces. This decrease in primary employment would lead to a drop in total employment in Rosebud County of 1,360 jobs. (Some growth in secondary employment between 1983 and 1987 would occur due to long term changes in the composition of the economy.)

L. SOCIOLOGY

1. Population

The 1980 population of Ashland is 569, up from 400 in 1970 (U.S. Bureau of the Census, 1980; Department of Energy, 1979). This can be represented as a 3.53% rate of annual increase.[1]

With the opening of the MONTCO mine in 1982, and with the assumption that all the mine and secondary employees will stay in Ashland, the population changes are shown in Table 2-2. There are several other assumptions made in these population figures. First, construction workers will come from outside the area while 50% of the operating workers will be local hires (See Murdock and Leistritz 1979, Leistritz, Murdock and Leholm 1980). Also, the population to employment multiplier used for the construction work force is 1.2 while it is 1.65 for operational workers (Murdock and Leistritz, Murdock 1980).

Overall, Ashland has the potential of a 115% increase in population between 1980 and 1990 due to projected growth and the MONTCO mine.

[1]The annual rate of increase is calculated by:

$$r = \frac{\log \left(\frac{Pn}{Po}\right)}{n \log e}$$

where:

r = rate of natural increase
P_n = 1980 population
P_o = 1970 population
n = time interval P_n-P_o
e = base of the natural logarithms

2. Community Services

The level of service availability in Ashland and Rosebud County is most likely the same as described in Department of Energy (1979), McQuiston (1979), Williams (1975) and Bureau of Land Management (1979).

3. Ashland as a Community

It is characterized by a pattern of social life in which most of everyday activities are accomplished through generally informal relations, and a well established system of roles and statuses in the community (Hillery, 1968; Warren, 1978; Cortese, 1980; Freudenburg, 1978, 1980).

Ashland can also be seen as an independent community. That is, a community that is small in population, isolated, has a simple technology, and has a marked stability (Hawley, 1950). This type of community structure has led to a great emphasis on local self-sufficiency and a distrust of governmental and other agencies outside the area (Murdock and Leistritz, 1979).

4. Attitudes

Overall, most residents in the Powder River area favor coal development (BLM 1980). This favorability, however, is not unconditioned; if it is felt that the nation does not need the coal to ease the national energy problems or that reclamation is not possible or not planned, favorability towards coal development would be greatly reduced.

Also associated with attitudes towards coal development are desires to see some controls on development. The controls are of two types: environmental and governmental. Environmental controls are centered around reclamation and concern for water supply and quality. The governmental controls are unspecified, but a strong feeling exists that some level or levels of government should exercise some controlling authority over development. Stated in another way, it is felt that mining companies should not have a free hand in the development of coal.

With respect to whether people were more concerned with environmental or social impacts, the responses were evenly split.

M. AIR QUALITY AND NOISE

Noises and odors are of a natural origin except for some influence from vehicles and farm machinery.

CHAPTER III ENVIRONMENTAL CONSEQUENCES

This section describes the significant environmental effects that would occur with implmentation of the proposed action including the alternatives. Such items as threatened and endangered plant and animal species, floodplains and wetlands, and wilderness values have been considered and are discussed as appropriate. Also, negative declarations included in the matrices are not presented within the impact descriptions in this section. Principal basis for the analysis is the professional judgments of the resource specialists, public and other agency input, and related works, as referenced.

I. NO ACTION ALTERNATIVE

The no action alternative would result in no disruption of the natural land surface.

Under the no action alternative, about 403.8 million tons of coal would not be recovered. Three levels of government participate in mining through their taxing power. The federal government's royalty of (at least) 12.5% of the mine-mouth sales price of the coal would, at $10.00 per ton and 3,465,000 tons of federal coal per year yield an annual tax harvest of about $4,331,000, half of which ($2,165,500) would be rebated to the state. The state of Montana severance tax of 30% is applied not to the sales price but to the sales price less some production-based tables-the Contract Sales Price (CSP). The CSP is a function of a complex formula, however, generally the severance tax is about 22% of the mine-mouth sales price. The Southwest Otter EMU, producing 10.3 million tons per year at $10 per ton, would generate about $22,700,000 of annual severance taxes. County and school taxable value equals 45% of the contract sales price or, at $10 per ton mine-mouth sales price, $3.33 per ton. Powder River County 1977 mill levies, including schools, averaged about 82 mills. The Southwest EMU, producing 10.3 million tons, would at that rate generate about $2,900,000 in gross proceeds taxes for the county and schools (27.2¢ per ton - $3.33 x .082) in Powder River County. No mine based taxes would flow to Rosebud County although many of the population based impacts would occur in Rosebud County (at Ashland).

Under the no action alternative, the paleontological resource would remain undisturbed. However, the potential for exposure and study of unearthed fossils would be lost.

If mining does not occur, none of the impacts related to this tract will be experienced.

II. PROPOSED ACTION

A. TOPOGRAPHY

The natural variety of landforms now displayed within the area would be greatly reduced by mining. Slopes, out of necessity to abate erosion, would be reduced. Changing or altering the natural erosional patterns will increase the rates of the area's sediment yield until such time that natural vegetation can be reestablished.

B. GEOLOGY

The Montana Department of State Lands requires additional testing to assure that potential toxic horizons are not overlooked.

The major impact of the proposed action would be the removal of about 403.8 million tons of coal.

C. PALEONTOLOGY

Fossils may be destroyed during the mining process. However, surface disturbance may unearth fossils that could be collected and studies made of specimens that would have otherwise remained buried.

D. SOILS AND RECLAMABILITY

The proposed action would have a significant impact on the soil in the tract (See Table 2-1). By the end of mine life, 7,443 surface acres would be disturbed, in addition to 160 surface acres used for facilities and haul roads. Haul roads would utilize 127 acres, of which approximately 76 percent are outside the EMU.

Soil impacts include: displacement of soil from wind and water erosion, change in soil structure and natural fertility, soil compaction from haul roads, and significant problems in revegetation and stabilization on steep slopes.

In the tract, there is a low potential displacement of soil by wind erosion of 64 percent and a moderate potential displacement of soil by water erosion of 60 percent. (See Table 2-1.) Proper seeding of the stockpiles will reduce this.

Disturbances of the soil would result in alterations of soil structure and porosity. This alteration would affect permeability, infiltration rates, soil-air and soil-water relationships and bulk density. The natural fertility would be affected by disruption of the nutrient cycle and a decrease in organic matter content within the soil. Salinity content would increase as a result of the lower calcareous horizons being brought to the surface.

The soil reconstruction potential is derived from the National Soils Handbook (USDA). The soil hazard conditions determine the reconstruction potential.

The tract is rated as 16 percent fair and 84 percent poor for reconstruction. Suitability of the soil material for plant growth is rated as 2 percent good, 22 percent fair, 33 percent poor and 43 percent unsuitable. (See Table 2-1.) the soils rated poor can be reclaimed, but would require more intensive and costly management to be revegetated and stabilized.

E. WATER RESOURCES

1. Ground Water

The primary effect of mining on ground water would be on well water in and near the tract during mining and on long term water quality. Ten stock wells would need to be redrilled to about the premine depth. Water levels in about ten wells in the vicinity of the tract would be very much reduced and possibly could go dry during mining. Flow into the pit during mining would be highest among the Otter Creek area tracts, preliminarily estimated at 37,00 cu ft/day with an adequate stream buffer (Cannon 1980).

Following mining, water quality at the depth of the Knobloch coal seam and alluvium in the vicinity of the mine would be degraded by increased salinity. The impact would be long term but the degree is unknown. The water would be useable for stock but would be even more marginal than the poor quality water currently used for household and irrigation purposes.

2. Surface Water

Stream flow in Otter Creek would be only slightly reduced during mining if an adequate stream buffer is provided (Cannon 1980). Sediment yields can be considered to be proportional to the soil erosion losses discussed in the soils section. A primary effect on surface water is related to increases in ground water chemical concentration following mining. However, ground water from the mined area would be diluted by upstream flow when used for spring irrigation by waterspreading or fish spawning, so downstream effects would be slight.

3. Alluvial Valley Floors and Floodplains

Plants drawing from subsurface water (subirrigation) in the alluvium would be slightly influenced by increased ground water chemical concentrations following mining. The effect would be

greatest in the subirrigated land adjacent to the tract; downstream land would not be affected as much because less concentrated water from outside the tract would dilute increases in concentrations from mining the tract. Crops that are more sensitive to salts would be affected more than less sensitive ones. For example, alfalfa is more sensitive than barley.

F. VEGETATION

If the range is in excellent condition (100-76%) there would be an approximate loss of 2,211 to 1,580 AUMs. However, in its present condition, there would be a loss of approximately 1,393 AUMs.

Reestablishment of native vegetative communities depend upon climatic conditions, species diversity and reclamation technique.

The reclamation process for the initial cut would probably be delayed for 2-3 years dependent upon the mining operation. When the mining operation gets into a cut-and-fill situation then the reclamation process would start. Provided there is adequate vegetation present on the reclaimed land, grazing would start after the sixth or seventh year on the initial 186-acre cut and approximately in the fifth year after the mining process becomes a cut-and-fill operation. As mining proceeds in other areas of the tract, not all of the land would be utilized for mining at any one time and grazing could occur on portions of the tract.

Mining of the area would temporarily eliminate opportunities for domestic livestock to occupy the surface and to utilize the forage. However, vegetative production may be better after mining (due to extensive reclamation work) and the area may produce more than the current number of AUMs per acre. There is, however, no evidence that the plant community that ultimately evolves would support higher levels of livestock grazing than the premining vegetation supported.

Additional impacts resulting from vegetation disturbances would be: (a) possible reduction of the visual aesthetics, (b) increased soil erosion, and (c) reduction in the amount of wildlife and livestock forage.

The Office of Surface Mining assures that the mining company establishes a diverse, effective and permanent vegetative cover to standards set by the Montana Department of State Lands and the Federal Bureau of Land Management.

G. LAND RESOURCES

1. Agriculture

The proposed action would have a significant impact on agriculture in the tract. (See Table 2-3.) By the end of mine life, 7,443 acres would be disturbed, in addition to 287 surface acres used for facilities and haul roads.

TABLE 2-3

Creek Coal Tract ~~(Without Exclusions)~~

Percent of area	Acres	Land Capability Class 1/ Non-irrigated	Irrigated	Use of land	Predicted Average Yields (Acres x Avg Prod/Yield/Acre) = 2/ Wheat Dry Land (Bu)	Wheat Irrigated (Bu)	Barley Dry-land (Bu)	Barley Irrigated (Bu)	Oats Dry-land (Bu)	Oats Irrigated (Bu)	Alfalfa Tame Hay Dry-land (Ton)	Alfalfa Tame Hay Irrigated (Ton)	Alfalfa Tame Hay Dry-land (Ton)		Pasture Dry-land (AUM)	Pasture Irrigated AUM
2.06	153	III	—	Tame Pastureland	3672	—	4590	—	—	—	229.5	—	183.6	—	229.5	—
1.10	82	III	—	Cropland	1476	—	2050	—	—	—	123.0	—	98.4	—	106.6	—
9.28	244	III	II	Cropland	6594	13146	9783	18141	4576	22065	234.8	1273.5	216.0	—	217.5	2909
<1	2	III	II	Cropland	34	104	52	132	—	160	2.0	9.0	1.2	—	2.2	20
6.46	481				11776	13250	16475	18273	4576	22225	589.3	1282.5	499.2	—	555.8	2927
<1	49	IV	—	Not Presently Cropped	1274	—	1666	—	3920	—	73.5	—	49.0	—	73.5	—
3.13	233	III	—	Not Presently Cropped	4717	—	6426	—	1880	—	333.6	—	237.5	—	314.7	—
4.96	369	III	IV	Not Presently Cropped	9270	19391	14489	27180	6376	30084	358.2	1803.5	277.5	—	325.1	4217
8.75	651	III	III	Not Presently Cropped	14595	28728	23531	37748	8600	45226	587.5	2671.0	557.3	—	585.1	6426
1.69	126	III	—	Not Presently Cropped	2718	—	3560	—	1215	—	163.5	—	128.4	—	159.1	—
<1	13	IV 45%	—	Not Presently Cropped	—	—	—	—	—	—	—	—	—	—	5.3	—
19.36	1441				32574	48119	49612	65228	17991	75310	1516.3	4577.5	1249.1	—	1462.5	10683
<1	23	III	II	Cropland	713	1311	1127	1817	—	2185	20.7	126.5	20.7	—	20.7	276
<1	32	III	—	Not Presently Cropped	768	—	960	—	—	—	48.0	—	38.4	—	48.0	—
<1	32	III	II	Not Presently Cropped	768	1664	1248	2080	1664	2496	35.2	160.0	25.6	—	28.8	384
<1	11	IV 45%	—	Not Presently Cropped	—	—	—	—	—	—	—	—	—	—	4.5	—
1.01	75				1536	1664	2208	2080	1664	2496	83.2	160.0	64.0	—	81.3	384

cation is derived from the published Powder River County Soil Survey Report issued

for cropland and average predicted crop yield derived from the published Powder Report, issued June 1971 and data from Agricultural Stabilization and Conservation ce County.

Impacts on agriculture include displacement of 481 acres (246 acres subirrigated and 235 acres nonirrigated) of class II, III and IV privately-owned land that would produce, on the average, 1203 tons of alfalfa and 481 AUMs or 18,398 bushels of wheat per year.

The state of Montana owns 23 acres of Class II and III land that would produce, on the average, 58 tons of alfalfa and 23 AUMs or 1311 bushels of wheat per year, which will also be displaced.

a. Economic Impacts On Agricultural Sales Activity

(See the Regional paper-"Agricultural Economics and Agricultural Impacts" for the classification of impacts.)

A loss of approximately 38,500 (all values in 1977 dollars) of ranch output and of about $9,600 of secondary income was estimated due to on-site disruption at peak disturbance.[1] Another $80,400 of agricultural output and $21,000 of secondary income would be lost due to urbanization of hay meadows near Ashland. Total output (ranch sales) losses of $118,900 place this EMU second in order of agricultural impacts.

Information on the degree to which ranchers would be compensated for these losses is not available. It is known however that many ranchers value their lifestyle so highly that no compensation would be seen as adequate (Bradley 1979, Bennett 1980). Ranchers away from the coal would not participate in the benefits of developemnt so there is little opportunity that they could be compensated even if they were able to determine an adequate amount of compensation.

b. Indirect Impacts (Interactive Effects)

Ranchers, along with all other businesses, would probably experience higher costs for labor and inflation in the cost of locally provided goods and services. Whether these higher costs would affect their profitability depends on future prices they receive for their output and the degree to which they can continue to substitute capital goods (machinery, etc.) for labor.

Physical scientists on the site-specific-analysis team predicted nonlosses in off-site agricultural production

[1] To correctly state income losses, ranch budget simulation analytical models and an inter-industry model would be needed. As these analytical tools were not available to do the site specific analyses, the values used are estimated from secondary data. Any bias in the anlysis was uniform (consistent error) and should not affect inter-tract comparisons. Bureau of Land Management agricultural specialists are attempting to secure access to more sophisticated analytical tools for future analyses of agricultural impacts.

due to changes in water quality or quantity. Since there are no estimates of changes in off-site productivity, no significant economic impacts other than those previously shown are expected to occur.

c. Rancher Perspectives on Economic and Social Impacts

The four agricultural landowners in the Southwest Otter Creek EMU were contacted to ascertain their views. The largest landowner holds 49% of the land in the EMU. The smallest landowner holds 8% of the EMU acreage. One of the landowners felt he would suffer a net economic hardship while one felt he would benefit economically with mining. Two of the landowners felt they would suffer a lowering of their level of quality of life and one of the ranchers adamantly opposes development of mining. Three ranchers were undecided whether they were in favored development of coal mining or not.

2. Recreation

No significant long-term impacts are expected to occur on the tract. Some secondary impacts would occur. Overall recreational demand on federal and private lands would increase due to population increases and the construction or relocation of roads at the mine site might improve legal and/or physical access to some areas. These increases would probably reduce levels of recreation enjoyment due to increased crowding, litter, and pollution at and near developed recreation sites.

3. Other Land Uses

Impacts on land use would be relatively minor but highly concentrated. Industrial activities would be introduced into an area of no previous activity and with little ability to support mining without construction of major facilities and improvement of existing transportation routes. The existing ranching, farming, and wildlife uses of the tract would be displaced for the life of the mine but would again be possible after reclamation. The mine would disturb 7,443 acres plus additional offsite acreages for roads, railroads, and utilities. Assuming respective rights-of-way widths of 100, 200, and 60 feet, the additional disturbed area would total 552 acres for relocation of 5.75 miles of the county road, a 10-mile rail spur from the proposed Tongue River Railroad, and a minimum 33-mile powerline route from Colstrip.

Changes in the land from these mine-related uses would be mostly temporary and insignificant after reclamation.

The existing road system would have to be extensively upgraded to handle the increased traffic caused by mining. Problems associated with this include increased trespass, vandalism,

I. CULTURAL RESOURCES

All sites within the tract boundaries would be subject to direct impact from construction of facilities, transportation corridors, powerline corridors and mining activities, resulting in damage and destruction of sites and their immediate environmental context. Sites not subject to immediate direct impact will receive indirect impacts from increased erosion, increased access and increased vandalism. Cultural resources buried by alluvial and colluvial deposition and not previously located in surface inventory will be destroyed. Should the tract be leased, a mitigation program would be undertaken for all affected cultural resources in the tract. If avoidance and preservation alternatives are not feasible, a scientific program of data retrieval would be developed and implemented.

J. VISUAL RESOURCE MANAGEMENT

Mining would completely change the character of the tract. Visual impacts would increase in the form of land disturbances due to the mines, roads, railroads and utilities. Changes to the topography, vegetation and scenic quality would occur. Currently, there are no industrial influences in the area, so the contrast would tend to be extreme. Along with this, some decrease in visibility would occur from dust and vehicle emissions. Overall, adverse impacts would be relatively insignificant both during and after mining because the mine would not be readily visible from any major highway and the topography would not be significantly altered after reclamation. There is a small amount of above average, "class B", scenery which would be affected, but due to the location, these visual impacts would be experienced only by persons visiting the mines. Generally, the visual impacts would be about the same as those of other mines in the region. All of the impacts would either cease or be reduced to very low levels when mining ends and reclamation is completed.

K. ECONOMICS

1. Employment Change

The Southwest Otter Creek tract would support a mine employing about 364 operations workers. If the mine were open in 1987, employment would peak at 456 workers (some construction and operations workers would be there simultaneously). This would induce the creation of 87 secondary jobs in Rosebud County between 1987 and 1990. By 1990 mine employment would fall by 92 workers. The total 1990 (primary and secondary) employment with Northwest Otter Creek would be 451 above what it would have been without the development.

2. Cost of Living Implications* - For Ashland Area Mines Only

Growth in the Ashland area will probably result in significantly higher cost of living with increased housing costs contributing most to overall increased cost of living.

While it is not possible to state exactly how many people will be directly affected, a recent study (University of Montana 1979) indicates that about three in every ten eastern Montana households had low or fixed income (less than $10,000 per year-1978 dollars) and 17% of the households are headed by persons of retirement age (65 and over). If housing cost increased by 25%, then units which in 1978 cost from $150 to $199.00 per month, would increase to from $187.00 to $248.00 per month. The Unviersity of Montana study found that 49% of those buying their homes in eastern Montana and 79% of those renting paid $199.00 per month or less and that about 23% of all households felt they could not afford to pay more than $199.00 per month for shelter. As increases in housing costs of 25% are likely (Appendix D of the Regional paper "The Economic Setting of Southeast Montana"), it is therefore likely that nearly three of every ten households confronting the higher housing costs will be low or fixed income households, that about one in every six will be a household with a household head of retirement age and that two of every nine households will have difficulty adjusting to the higher housing costs.

3. Fiscal Impacts

Southwest Otter Creek would be one of the three EMU's with the highest fiscal impacts. Ashland, unlike Colstrip, is not being provided community capital additions (schools water, sewer, etc.) by a sponsor.* A prefiled bill, LC 181,+ would, if passed by the Montana Legislature, encourage areas like Ashland & Colstrip to incorporate to receive Coal Board assistance. Ashland, if it incorporates, would be at a relative disadvantage to Colstrip and Spring Creek (new town) as the other communities would already have made much of their capital investment before incorporation. Unlike Northwest Otter Creek, development of Southwest Otter Creek would result in no mine based tax revenues flowing to Rosebud County (all coal mined and taxes paid in Powder River County). Increasing population-based costs near Ashland would, therefore, not be offset by increased mine revenues if Southwest Otter Creek were developed.

L. SOCIOLOGY

1. Population

The population affect of a Southwest Otter Creek mine is shown in Table 2-4. All of the assumptions stated in Chapter II

Literature: Wallwork, Susan Selig, Maxine C. Johnson and Paul E. Polzin. Housing Needs and Preferences: A Survey of Montana Households. University of Montana, Missoula, Montana. 1979.

*Montana Power has contracted for much of the capital additions in Colstrip.

+State Senator Tom Towe, personal communication, December, 1980. The exact wording of the bill is not yet known but areas like colstrip and Ashland would be encouraged to incorporate.

TABLE 2-4

Population to Ashland and Broadus
From A Southwest Otter Creek Mine,
And Total Population 1980-1990

Year	Additional Population to Ashland From A Southwest Otter Creek Mine[a]	Additional Population to Broadus From A Southwest Otter Creek Mine[a]	Ashland Total Population[b]	Broadus Total Population[c]
1980			569	715
1981			589	707
1982			657	699
1983			1,205	691
1984			1,182	684
1985			810	676
1986	289	142	1,123	861
1987	37	25	1,209	878
1988	-181	-120	1,216	751
1989	45	30	1,387	774
1990			1,414	766

[a]Includes construction, operational and secondary workers

[b]Includes the projected growth and MONTCO mine population from Table 2-2, Chapter II

[c]Based on geometric growth of Broadus using a rate of annual increase of -.0111

apply here. In addition, it is assumed that 40% of the population increase from a Southwest Otter Creek mine would go to Broadus to live because of the population growth in Ashland.

With a Southwest Otter Creek mine, Ashland's population increase would be 149%, including the MONTCO mine, over the decade of the 80's while Broadus would increase by approximately 7%.

Because Broadus is very similar to Ashland in terms of community structure, the impacts to Broadus would be similar to those in Ashland, although to a much lesser extent.

These population figures should be seen as heuristic. They are based on many simplifying assumptions. Not only are the figures based on the assumption that growth rates will remain the same, but that the incoming population will actually settle where it is suggested here.

2. Community Services

The community services in Ashland that will likely be the most severely impacted are medical, housing, and recreation (Williams 1975, Murdock, Leistritz and Schriner 1980). Other services and institutions that will be affected are the schools and the criminal justice system.

3. Attitudes

The impacts of development on social attitudes cannot be assessed until after development has occured. There is no way to estimate what changes, if any, in attitudes would occur.

4. Changes In Ashland Community Structure

Given the increase in population to Ashland, the community can be expected to change along the following dimensions. First, increase in population from mineral development will result in a more heterogeneous community which, in turn, generates varying degrees of community conflicts (Albrecht 1978, Cortese 1980, Murdock and Leistritz 1979). Secondly, community interaction will tend to become more formal due to the increase in the population which results in the community- wide social network ("everyone knows everyone else") to be fragmented and mnore aspects of social life are accomplished through newly created formal organizations (or bureauacries, such as welfare agencies, mental health clinics, employment agencies). Previously established agencies become more routinized and formal in their operation, e.g., police departments, schools (Freudenburg 1978, 1980, Hooper 1980).

In terms of the polity, more decisions that affect the community will be made by extra-local sources.

Finally, it must be noted that many of these changes, such as extra-local control and increasing bureaucratization, are occuring in rural communities like Ashland without development (Vidich and Bensman 1968, Warner 1974, Warren 1978); the impacts of coal development just hasten these changes.

M. AIR QUALITY AND NOISE

The present noises and odors would dramatically change from natural to industrial origins as heavy mining equipment, rail and road traffic and explosives use are begun or increased from present levels.

III. SHORT-TERM VERSUS LONG-TERM IMPACTS

A. SHORT TERM

Production through life of mine is estimated at 403.8 million tons of coal. The tract would be temporarily committed to a single use that would in turn impact other potential uses.

Short-term impacts on wildlife from mining of the four Ashland-Otter Creek tracts are summarized. Up to ten sharp-tailed grouse arenas and the surrounding nesting habitat would be lost. Approximately 64 mule deer and 184 antelope would be displaced from wintering areas during mining. Nesting golden eagles and prairie falcons would be disturbed by mining and an unknown quantity of hunting territories would be disturbed by mining. Habitat for non-game birds, mammals and reptiles would also be lost in the short term. An undetermined number of birds and animals would be killed by vehicular accidents and illegal hunting activity due to the increased human population during the life of the mines. Impact on the Otter Creek fishery would be dependent upon the maintenance of water quality and quantity.

B. LONG TERM

Evidence of mining and reclamation would remain in the form of less contrasting topography and an alteration of soil texture and porosity.

Long-term imapcts on wildlife would be dependent on the success of reclamation. If shrubs and ponderosa pine cover cannot be restored, the vegetative diversity of the area would be decreased. This decrease in the vegetative diversity would also decrease the variety of birds and animals currently found in the tracts.

IV. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCE

The coal removed by mining and that left by current recoverable techniques would be lost from future use.

V. NET ENERGY ANALYSIS

A net energy analysis was calculated using the guidance contained in BLM Washington Office Information Memo 79-282, August 1979. Approximately 38 British thermal units (BTUs) would be expended to produce a pound of coal. That pound of coal, in turn, would produce about 8,462 BTUs. The ratio of energy produced to that expended is over 225 BTUs/1 BTU.

The net energy relationship (ratio of energy produced to energy consumed) for the Southwest Otter Creek EMU is 324 to 1.[1]

1 Based on the Btu value per pound of coal as given in the tract delineation reports and on an average input energy value of 25.6 Btu's of energy consumed for each pound of coal produced (average of the energy consumption of the Decker mines as described by USGS in a 1977 EIS and the WECO area B expansion as described by the Montana Department of State Lands in a 1978 EIS). Only direct energy consumption was considered (the ratios shown do not contain any estimate of energy used in transporting the coal from the mine to the demand center).

SOUTHWEST OTTER CREEK

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Soils	There are 45 soil series in the tract mapped at level two in a survey done by the Soil Conservation Service, which are found along steep-sided ridges, divides, footslopes and terraces.	There will be displacement of soil by water and wind erosional forces; change in soil structure and natural fertility and significant problems in revegetation and stabilization on steep slopes.	Significance of the impact will be high. Reconstruction potential is rated as 84% poor and suitability of soil material for reclamability is rated as 33% poor and 43% unsuitable	Data reliability is 30% from the Powder River County Area Soil Survey. Better soils in the bottomlands are more accurately mapped than those on the rangelands and steep-sided slopes.	The overall view of the Tract for reconstruction potential is lower than what it actually is because of the low reliability of the Powder River County Area Soil Survey.
Water Resources Ground Water Use in Tract	10 stock wells are in use in the Tract.	Wells would need to be redrilled, if needed, after mining.	Minimal cost for mining company to redrill well	Good	
Quantity	Knoblock coal is saturated The natural flow is preliminarily estimated at 37,000 cu ft/day and is toward Otter Creek.	Water will flow into the mine pit at the given rate. About 10 wells would be affected during mining outside the Tract.	Significant during mining.	Fair-good	
Quality	TDS for area averages about 2,500 for Knoblock coal. TDS for five wells averages 1,200 with a medium of 800 mg/L.	Increase in salinity of wells in the vicinity of mine in and above Knoblock coal seam will occur. Water would still be useable for stock but would be even more marginal for households and irrigation	Significant and long term.	Fair	Reliability would be better if could better predict ground water concentrations following mining.
Surface Water Quantity	Otter Creek is a small perennial stream with a mean annual flow at Ashland of 6,220 ac ft. 4,200 acres of this drainage is irrigated.	Only slight redcution of flow during mining with adequate stream buffer. Possibly slight effect after mining.	Minor if buffer used.	Fair-good	

SOUTHWEST OTTER CREEK

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Quality	Average TDS is about 2,000 mg/L. High salinity and medium sodium irrigation hazard occurs except during high flows, 0.0-1.2 ac ft/mi^2/yr of sediment yield.	Increases in baseflow TDS after mining. Water would still be useable for stock high flow water spreaders. Sediment yields should be proportional to soil erosion losses.	Very slight but long term.	Fair	
Alluvial Valley Floors and Flood Plains	Otter Creek has a possible AVF and floodplain in and adjacent to the Tract.	Following mining, degradation of ground water quality would occur in adjacent alluvium. Small reduction in more salt sensitive crop productivity.	Slight but long term.	Same as above	
Agriculture	There are 504 acres of Class II, III and IV land in the tract that is currently being cropped. This land is found in the bottomlands.	There will be displacement of lands currently being cropped and suitable for cropland.	It will reduce the alfalfa hay production by 1261 tons and 504 AUMs per year for at least a 5 year period.	Data reliability is 30% from the Powder River County Soil Survey Descriptions and Interpretations prepared by the Soil Conservation Service. Better soils in the bottomlands are more accurately mapped. Soils tend to be better than indicated in the soil survey.	

SOUTHWEST OTTER CREEK

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Vegetation Rangeland types Ponderosa Pine Savannah Undifferentiated Streambottoms	EMU — Acres Grassland 2352 Sagebrush-grassland 3947 Ponderosa pine 614 Other 530 7443	Acres Being Disturbed Grassland 2352 High Sagebrush-grassland 3947 High Ponderosa pine 614 High Other 530 Low 7443	High - - - - Long term elimination of the natural vegetation mosaic and species diversity	Good	Reclamation of Ponderosa pine not yet proven.
Animal Unit Months (SVIM)	1393 AUMs	High	Loss of 1393 AUMs High	Good	
Animal Unit Months If Range is in Excellent condition 100-76%				Good	100% 76% 2211 AUMs - 1580 AUMs
Threatened Endangered or Noxious species	There are no threatened or endangered plant species found growing in the EMU. However, there are six noxious species found growing in the Powder River Resource Area, but it has not been determined if these species are found growing in the EMU. The species are: A. Convolulus aruensis B. Cirsium arvense C. Euphorbia esula D. Centaurea ropens E. Cardaria draba F. Centaurea maculosa	Low	Low	Good May 16, 1980 Regional Director Region 6 U.S. FWS Denver, Colorado	

ELEMENT	PRESENT SITUATION		ANTICIPATED EFFECT OF LEASING/DEVELOPMENT		SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Reclamation-Vegetation	On Federal, State and Private lands, the Office of Surface Mining (OSM) assures that the mining company establishes a diverse, effective and permanent vegetative cover to standards set by the Department of State Lands of Montana and the Federal Bureau of Land Management.		Low		High-failure of Reclamation Low-success of Reclamation	Good	
Wildlife Habitat	Acres	% of Total	Acres Disturbed	Year 2026			
Grassland	2352	31	2352	Low negative	Low negative	Good	
Sagebrush-grassland	3854	53	3854	Moderate negative	Low negative	Good	
Ponderosa pine	614	8	614	High negative	High negative	Good	Reclamation of Ponderosa pine not yet proven.
Agricultural lands	623	8	623	Low negative	No Change	Good	
Population	Level of Use						
Sharp-tailed grouse	High		Moderate negative		Low negative	Good	
Mule Deer	Average		Low negative		Low negative	Good	
Antelope	High		Moderate negative		Low negative	Good	
Golden Eagle	Average		Low negative		Low negative	Good	
Prairie Falcon	Low		Low negative		Low negative	Good	
Other Raptors	Average		Low negative		Low negative	Good	
Non-game birds and mammals	Average		Low negative		Low negative	Good	
State species of special interest or concern	Low		Low negative		Low negative	Good	
Reptiles and Amphib	Average		Low negative		Low negative	Good	
Threatened or Endan	None Occur		-----		-----		
Fisheries-Otter Cr.							
Spawning	High		Not assessable		Moderate negative	Good	Impacts dependent on maintenance of water quality and quantity.
Stream fishery	Average		Not assessable		Low negative	Good	

SOUTHWEST OTTER CREEK

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Noise Air Quality	Natural sounds are prevalent. Some noise from vehicles and farm machinery.	Severe intrusions of heavy equipment. Construction and use of rail system. Use of explosives. Increased traffic on Otter Creek road.	Quite severe during mining. Impact would cease when mine is closed.	Excellent	Impossible to mitigate during mine life.
Transportation Employee:	Existing access by gravel or dirt roads. Low use and maintenance.	Increased traffic on U.S.212, Otter Creek and Tongue River roads. Potential for more accidents. Improvements to roads.	Moderate on all accounts during mining. Very low after mines close.	Good	Road improvements should contribute to safety after mining traffic ceases.
Product:	Roads inadequate for transport. No rail system near area.	Improvements to roads Construction of roads Construction of railroad Rail traffic introduced to area Increased hazards Increased surface disturbance	Moderate Moderate Possibly high Possibly high Moderate Low	Good for all items	
Land Use	No industrial activity. Some farming. Ranching is primary use.	Introduction of industrial activities. Land required for mines, roads, railroads, powerlines.	Moderate during mining. Low to none after reclamation.	Good	Existence of power and rail lines may encourage further development of area.

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litter, and fire hazard potentials. The railroad spur may eventually encourage additional industrial development of the area. Increased road and rail traffic also increases the potential for more accidents because of greater exposure. The impacts would cease at the end of mining if unnecessary transportation corridors are abandoned and reclaimed; however, this type of land use commonly remains longer than the activity it serves.

H. WILDLIFE AND FISHERIES

The impacts upon fisheries and wildlife habitats and populations are summarized in the matrix (appendix). Impacts are rated for the projected 40-year life span of the mine.

Four sharp-tailed grouse arenas along with the surrounding nesting habitat would be lost in mining. The significance of this habitat loss on the grouse population would depend on the sequence of mining, reclamation and the possiblity of other mines operating in the area.

Mining would disturb hunting territories for the golden eagles and prairie falcons which nest east of the EMU. The extent of the disturbance is not known as actual territories have not yet been delineated.

Habitat for non-game birds, mammals, and reptiles would be lost during mining. No estimate of the numbers displaced is known, but it is felt it would be a low impact, based on the availability of similar adjacent habitats.

If surface runoff is controlled and the contributing aquifiers to Otter Creek are not significantly disturbed, the quality and quantity of water for fisheries would not be significantly affected. No accurate assessment of imapcts on the fishery can be made.

Habitat lost to mining would displace up to 80 antelope from two winter concentration areas. All or portions of these areas would be disturbed during the life of the mine. This disturbance would also affect up to 30 mule deer.

Habitat for non-game birds, mammals, and reptiles would be lost during mining. No estimate of the numbers displaced is known, but it is felt it would be a low impact, based on the availability of similar adjacent habitats.

Increased traffic along the Otter Creek Road and the influx of people to the area would increase the number of game and non-game birds and animals killed by vehicular accidents and illegal hunting activity. No estimate of this impact can be made at this time.